# PATENT ABSTRACTS OF JAPAN

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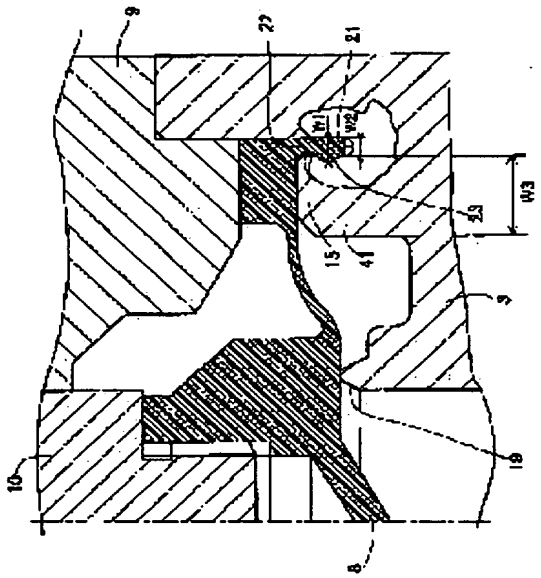
## (54) CHEMICAL CONTROL VALVE

(57)Abstract:
PROBLEM TO BE SOLVED: To secure further safety of an outside sealing structure while maintaining the flow capacity.
SOLUTION: The outside sealing structure has a first annular projection 23 formed on the inner side surface of a peripheral edge projecting part 22 of a diaphragm 8 with the thickness W1 larger than the width W2 of a seal groove 21. In the chemical control valve, the thickness W3 of an inner wall part 41 of the seal groove 21 is increased by narrowing the width W2 of the seal groove 21, compared with the outside sealing structure of a chemical control valve of a conventional technology, without changing the sum (W3+W2) of the thickness W3 of the inner wall part 41 of the seal groove 21 and the width W2 of the seal groove 21.

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CLAIMS

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[Claim(s)]
[Claim 1] The diaphragm made of a fluororesin formed in the lower limit of a rod, and the valve seat which said diaphragm sticks and estranges, The body made of a fluororesin with which the inflow way and outflow way which are open for free passage to said valve seat, said valve seat and said inflow way, and said outflow way were formed, It has the seal groove which enclosed the surroundings of said valve seat and was formed in said body. In the drug solution control valve which performs face sealing by fastening with said cylinder and said body, pressing the periphery lobe of said diaphragm fit in said seal groove In the condition of having had the 1st annular projection formed in the side face of the periphery lobe of said diaphragm, and having made the periphery lobe of said diaphragm pressing fit in said seal groove While giving peak value to the internal stress generated in the periphery lobe of said diaphragm when said 1st annular projection presses a part of side face of said seal groove The drug solution control valve characterized by increasing thickness for the wall section of said seal groove by narrowing width of face of said seal groove, without changing the sum of the thickness of the wall section of said seal groove, and the width of face of said seal groove.
[Claim 2] The diaphragm made of a fluororesin formed in the lower limit of a rod, and the valve seat which said diaphragm sticks and estranges, The body made of a fluororesin with which the inflow way and outflow way which are open for free passage to said valve seat, said valve seat and said inflow way, and said outflow way were formed, It has the seal groove which enclosed the surroundings of said valve seat and was formed in said body. In the drug solution control valve which performs face sealing by fastening with said cylinder and said body, pressing the periphery lobe of said diaphragm fit in said seal groove In the condition of having had the 1st annular projection formed in the side face of said seal groove, and having made the periphery lobe of said diaphragm pressing fit in said seal groove While giving peak value to the internal stress generated in the periphery lobe of said diaphragm when said 1st annular projection presses a part of side face of the periphery lobe of said diaphragm The drug solution control valve characterized by increasing thickness for the wall section of said seal groove by narrowing width of face of said seal groove, without changing the sum of the thickness of the wall section of said seal groove, and the width of face of said seal groove.
[Claim 3] The drug solution control valve characterized by making the 2nd annular projection which is the drug solution control valve indicated to claim 1 or claim 2, and enclosed the surroundings of said valve seat form in the fastening side of said body.
[Claim 4] The drug solution control valve which is a drug solution control valve indicated to any one of claim 1 thru/or the claims 3, and is characterized by making an elastic seal member intervene between the periphery lobe of said diaphragm, and the fastening side of said cylinder.
[Claim 5] The drug solution control valve which is a drug solution control valve indicated to any one of claim 1 thru/or the claims 4, and is characterized for controlling the drug solution of semiconductor fabrication machines and equipment by **.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the drug solution control valve which controls drug solutions, such as semiconductor fabrication machines and equipment.
[0002]
[Description of the Prior Art] There is a thing as shown in the sectional view of drawing 8 in the drug solution control valve used in order to control the drug solution of semiconductor fabrication machines and equipment conventionally. Then, the configuration of the drug solution control valve 1 of drawing 8 is explained. The inflow way 31 and the outflow way 32 are formed in the body 3 fixed to the base plate 2. The inflow port 6 which screwed the connection nut 7 on the end of this point and the inflow way 31 is formed, and the outflow port 4 which screwed the connection nut 5 on is formed in the end of the outflow way 32. Moreover, the valve seat 19 is formed in the other end of the inflow way 31 on the top face of the body 3, and further, as the surroundings of a valve seat 19 are surrounded, the seal groove 21 is formed.
[0003] On the other hand, the covering 13 which formed the aeration port 14 is attached in the upper part of the cylinder 9 which carried out the interior of the piston rod 10. And interpolation of the spring 12 which energizes a piston rod 10 downward is carried out to the up space of the cylinder 9 formed with covering 13 and a piston rod 10. Moreover, the diaphragm 8 is screwed on the lower limit of a piston rod 10. The periphery lobe 22 is formed in the periphery of this point and a diaphragm 8. And a diaphragm 8 is fixed by attaching with a cylinder 9 and the body 3, where the periphery lobe 22 of a diaphragm 8 is inserted, pressing the periphery lobe 22 of a diaphragm 8 fit in the seal groove 21 of the body 3.
[0004] Therefore, if the air supply of the compressed air are carried out to the lower space of a cylinder 9 through the actuation port 11 of the body 3, by balance of the energization force of a spring 12, and the pressure of a compressed air, a piston rod 10 will move upward and the diaphragm 8 formed in the lower limit of a piston rod 10 will estrange from a valve seat 19. On the other hand, if a compressed air is exhausted from the lower space of a cylinder 9 through the actuation port 11 of the body 3, by balance of the energization force of a spring 12, and the pressure of a compressed air, a piston rod 10 will move downward and the diaphragm 8 formed in the lower limit of a piston rod 10 will stick to a valve seat 19. It enables this to control the drug solution poured in the outflow port 4 from the inflow port 6 through a valve seat 19.
[0005] Moreover, fluororesins (PFA, PTFE, etc.) are used for the quality of the material of components which ****, such as a diaphragm 8 and the body 3, in consideration of the property of the drug solution of the controlled system used with semiconductor fabrication machines and equipment.
[0006] Furthermore, the face sealing nature between a diaphragm 8 and the body 3 will be one of the most important matters, if the property of the drug solution of the controlled system used with semiconductor fabrication machines and equipment is taken into consideration. As shown in this point and drawing 9 , this face sealing nature By compressing the periphery lobe 22 of a diaphragm 8 which has elastic force in the direction of a path, when the periphery lobe 22 of a diaphragm 8 is pressed fit in the seal groove 21 of the body 3 That is, when the periphery lobe 22 of a diaphragm 8 was crushed by the width of face W2 of a seal groove 21 from the thickness W1, it had secured with the stress (henceforth "seal stress") generated inside the periphery lobe 22 of a diaphragm 8.
[0007] In addition, although drawing 9 shows the condition that the periphery lobe 22 of a diaphragm 8 was pressed fit in the seal groove 21, the periphery lobe 22 of a diaphragm 8 is shown by the thickness W1 before [ explanation ] being crushed by the width of face W2 of a seal groove 21 for convenience.
[0008]
[Problem(s) to be Solved by the Invention] However, the drug solution of a hypertonicity is treated more

often as high integration of semiconductor fabrication machines and equipment progresses in recent years, and since dangerous things, such as fluoric acid, are also contained, the drug solution of a hypertonicity has come to be expected reservation of the further safety to face sealing structure.

[0009] In order to secure this point and the further safety, when width of face W1 of the periphery lobe 22 of a diaphragm 8 is thickened and the periphery lobe 22 of a diaphragm 8 is pressed fit in the seal groove 21 of the body 3, to it, it is [ that what is necessary is just to enlarge "seal stress" generated inside the periphery lobe 22 of a diaphragm 8 ] possible [ it ] to enlarge the squeeze of the periphery lobe 22 of a diaphragm 8. however, since the force of push the wall side face 15 of the seal groove 21 formed in the body 3 made of a fluororesin inside at this time also became large and the wall section 41 of a seal groove 21 changed into the condition of incline inside, in response to this force all over the wall side face 15 of a seal groove 21, "seal stress" generate inside the periphery lobe 22 of a diaphragm 8 be able to be made so large that it expected. then, the wall section 41 of a seal groove 21 does not incline inside -- as -- the above-mentioned matter -- in addition, although it is possible to thicken width-of-face W3 of this wall section 41 If the magnitude of the whole drug solution control valve 1 is the conditions which are not different from a former thing at this time, since a flow passage area (cross section of a valve seat 19, and the inflow way 31 and the outflow way 32) must be made small, the evil in which flow rate capacity declines will arise.

[0010] Then, this invention is the drug solution control valve made in order to solve the trouble mentioned above, and it makes it a technical problem to secure the further safety of face sealing structure, maintaining flow rate capacity.

[0011]

[Means for Solving the Problem] Invention concerning claim 1 accomplished in order to solve this technical problem The diaphragm made of a fluororesin formed in the lower limit of a rod, and the valve seat which said diaphragm sticks and estranges, The body made of a fluororesin with which the inflow way and outflow way which are open for free passage to said valve seat, said valve seat and said inflow way, and said outflow way were formed, It has the seal groove which enclosed the surroundings of said valve seat and was formed in said body. In the drug solution control valve which performs face sealing by fastening with said cylinder and said body, pressing the periphery lobe of said diaphragm fit in said seal groove In the condition of having had the 1st annular projection formed in the side face of the periphery lobe of said diaphragm, and having made the periphery lobe of said diaphragm pressing fit in said seal groove While giving peak value to the internal stress generated in the periphery lobe of said diaphragm when said 1st annular projection presses a part of side face of said seal groove It is characterized by increasing thickness for the wall section of said seal groove by narrowing width of face of said seal groove, without changing the sum of the thickness of the wall section of said seal groove, and the width of face of said seal groove.

[0012] Moreover, the diaphragm made of a fluororesin with which invention concerning claim 2 was prepared in the lower limit of a rod, The inflow way and outflow way which said diaphragm opens for free passage to the valve seat stuck and estranged and said valve seat, The body made of a fluororesin with which said valve seat and said inflow way, and said outflow way were formed, It has the seal groove which enclosed the surroundings of said valve seat and was formed in said body. In the drug solution control valve which performs face sealing by fastening with said cylinder and said body, pressing the periphery lobe of said diaphragm fit in said seal groove In the condition of having had the 1st annular projection formed in the side face of said seal groove, and having made the periphery lobe of said diaphragm pressing fit in said seal groove While giving peak value to the internal stress generated in the periphery lobe of said diaphragm when said 1st annular projection presses a part of side face of the periphery lobe of said diaphragm It is characterized by increasing thickness for the wall section of said seal groove by narrowing width of face of said seal groove, without changing the sum of the thickness of the wall section of said seal groove, and the width of face of said seal groove.

[0013] Moreover, invention concerning claim 3 is a drug solution control valve indicated to claim 1 or claim 2, and is characterized by making the 2nd annular projection which enclosed the surroundings of said valve seat form in the fastening side of said body.

[0014] Moreover, invention concerning claim 4 is a drug solution control valve indicated to any one of claim 1 thru/or the claims 3, and is characterized by making an elastic seal member intervene between the periphery lobe of said diaphragm, and the fastening side of said cylinder.

[0015] Moreover, invention concerning claim 5 is a drug solution control valve indicated to any one of claim 1 thru/or the claims 4, and is characterized for controlling the drug solution of semiconductor fabrication machines and equipment by **.

[0016] In the drug solution control valve of this invention which has such a description In the condition of

having made it pressing fit in a seal groove, the periphery lobe of a diaphragm By having the 1st annular projection formed in the side face of the periphery lobe of a diaphragm, or the side face of a seal groove, and pressing a part of side face of a part of side face of a seal groove, or the periphery lobe of a diaphragm Peak value is given to the internal stress generated in the periphery lobe of a diaphragm. It has secured by concentrating on a part of side face of a part of side face of a seal groove, or the periphery lobe of a diaphragm, and making the "seal stress" of face sealing act. Furthermore, since the sum of the thickness of the wall section of a seal groove and the width of face of a seal groove is the same as the thing of the conventional technique Although a flow passage area (cross section of a valve seat, and an inflow way and an outflow way) does not become small, since width of face of a seal groove was narrowed and the thickness of the wall section of a seal groove is increased The further safety of face sealing structure is securable, the seal groove made of a fluororesin not deforming greatly, and maintaining flow rate capacity, even if the peak value of the "seal stress" of face sealing is big.

[0017] Moreover, in the drug solution control valve of this invention, if the 2nd annular projection which enclosed the surroundings of a valve seat is made to form in the fastening side of the body, since face sealing will serve as double-seal structure, it is useful to improvement in the further safety of face sealing structure.

[0018] Furthermore, in the drug solution control valve of this invention, since it is suppliable with the elastic force of an elastic seal member even if the force which the body and the diaphragm made of a fluororesin contract and pinches a diaphragm in the body and a cylinder by controlling a hot drug solution becomes weaker if an elastic seal member is made to intervene between the periphery lobe of a diaphragm, and the fastening side of a cylinder, the handling temperature field of the drug solution of a controlled system can be extended to an elevated-temperature side.

[0019] In addition, there is a drug solution used with semiconductor fabrication machines and equipment among the drug solutions which the drug solution control valve of this invention makes a controlled system.

[0020]

[Embodiment of the Invention] Hereafter, the gestalt of the 1st operation of this invention is made reference, and a drawing is explained. The configuration of the drug solution control valve of the gestalt of the 1st operation is the same as the configuration of the drug solution control valve 1 of drawing 8 explained in the column of the conventional technique except for the face sealing structure mentioned later. Then, the same sign is attached, explanation is omitted and the same configuration is explained focusing on a different point.

[0021] The face sealing structure of the drug solution control valve 1 of the gestalt of the 1st operation As shown in drawing 1 , it had the 1st annular projection 23 which is formed in the inside side face of the periphery lobe 22 of a diaphragm 8, and has the larger thickness W1 than the width of face W2 of a seal groove 21, Without changing the sum (W3+W2) of thickness W3 of the wall section 41 of a seal groove 21, and the width of face W2 of a seal groove 21 compared with the face sealing structure (referring to drawing 9 ) of the drug solution control valve 1 of the conventional technique It consists of having increased thickness W3 of the wall section 41 of a seal groove 21 by narrowing width of face W2 of a seal groove 21.

[0022] As shown in the table of this point and drawing 2 , thickness W3 of the wall section 41 of a seal groove 21 is increased 1.4 times compared with the thing (refer to drawing 9 ) of the conventional technique. Moreover, while the width of face W2 of a seal groove 21 is 0.3 times thickness W3 (refer to drawing 9 ) of the wall section 41 of the seal groove 21 of the conventional technique, it has the thing (refer to drawing 9 ) of the conventional technique also 0.7 times of thickness W3 (refer to drawing 9 ) of the wall section 41 of the seal groove 21 of the conventional technique. That is, the width of face W2 of a seal groove 21 is reduced by 3/7 time compared with the thing (refer to drawing 9 ) of the conventional technique.

[0023] In the face sealing structure of drawing 1 , when the periphery lobe 22 of a diaphragm 8 is pressed fit in the seal groove 21 of the body 3, and by compressing the periphery lobe 22 of a diaphragm 8 which has elastic force in the direction of a path That is, when the 1st annular projection 23 of the periphery lobe 22 of a diaphragm 8 is crushed by the width of face W2 of a seal groove 21 from the thickness W1, "seal stress" is secured with the stress generated inside the periphery lobe 22 of a diaphragm 8.

[0024] If a squeeze is defined as "/(W1-W2) W1x100" at this time, as shown in the table of drawing 2 , it will be set to 20 (%) in the face sealing structure of drawing 1 , but since it is set to 10 (%) in the thing of the conventional technique of drawing 9 , in the face sealing structure of drawing 1 , it turns out that the stress generated inside the periphery lobe 22 of a diaphragm 8 is large.

[0025] namely, in the condition of having made the periphery lobe 22 of a diaphragm 8 pressing fit in a seal

groove 21 with the face sealing structure of drawing 1 By having the 1st annular projection 23 formed in the inside side face of the periphery lobe 22 of a diaphragm 8, and pressing a part of wall side face 15 of a seal groove 21 Peak value was given to the internal stress generated in the periphery lobe 22 of a diaphragm 8, and it has secured by concentrating on a part of wall side face 15 of a seal groove 21, and making the "seal stress" of face sealing act. Furthermore, since the sum (W3+W2) of thickness W3 of the wall section 41 of a seal groove 21 and the width of face W2 of a seal groove 21 is the same as the thing of the conventional technique (refer to drawing 9 ) Since width of face W2 of a seal groove 21 was narrowed and thickness W3 of the wall section 41 of a seal groove 21 is increased as shown in the table of drawing 2 although a flow passage area (cross section of a valve seat 19, and the inflow way 31 and the outflow way 32) does not become small (refer to drawing 8 ) Even if the peak value of the "seal stress" of face sealing is big, the seal groove 21 made of a fluororesin does not deform greatly. Therefore, the further safety of face sealing structure is securable, maintaining flow rate capacity.

[0026] In addition, for convenience, although drawing 1 shows the condition that the periphery lobe 22 of a diaphragm 8 was pressed fit in the seal groove 21, the periphery lobe 22 of a diaphragm 8 and its 1st annular projection 23 are shown, before [ explanation ] being crushed by the width of face W2 of a seal groove 21 (thickness W1). In practice, the periphery lobe 22 of a diaphragm 8 and its 1st annular projection 23 are crushed by the seal groove 21 as shown in drawing 3 .

[0027] Hereafter, the gestalt of the 2nd operation of this invention is made reference, and a drawing is explained. The configuration of the drug solution control valve of the gestalt of the 2nd operation is making the 2nd annular projection 25 which enclosed the surroundings of a valve seat 19 form in the top face 24 of the wall section 41 of a seal groove 21, i.e., the fastening side of the body 3, as face sealing structure (refer to drawing 1 ) of the drug solution control valve 1 of the gestalt of the 1st operation mentioned above is used as a double seal and shown in drawing 3 . Furthermore, O ring 27 (thing equivalent to an "elastic seal member") is made to intervene in the face sealing structure of drawing 3 between the periphery lobe 22 of a diaphragm 8, and the fastening side 26 of a cylinder 9.

[0028] That is, in the face sealing structure of drawing 3 , since the 2nd annular projection 25 which enclosed the surroundings of a valve seat 19 is made to form in the fastening side 24 of the body 3 and face sealing serves as double-seal structure, it is useful to improvement in the further safety of face sealing structure.

[0029] Moreover, although fluororesins (PFA, PTFE, etc.) are used for the quality of the material of components which ****, such as a diaphragm 8 and the body 3, as pointed out in the column of the conventional technique, the drug solution control valve 1 of the gestalt of this operation This point and a fluororesin (PFA, PTFE) Since it has coefficient of linear expansion as shown in the table of drawing 6 (thing to PTFE), and drawing 7 (thing to PFA) The body 3 and the diaphragm 8 made of fluororesins (PFA, PTFE, etc.) may contract that the drug solution of a controlled system is an elevated temperature, and the force which pinches a diaphragm 8 in the body 3 and a cylinder 9 may become weaker.

[0030] However, it sets in the face sealing structure of drawing 3 . By making O ring 27 intervene between the periphery lobe 22 of a diaphragm 8, and the fastening side 26 of a cylinder 9, and controlling a hot drug solution The body 3 and the diaphragm 8 made of fluororesins (PFA, PTFE, etc.) contract, and since it is suppliable with the elastic force of O ring 27 even if the force which pinches a diaphragm 8 in the body 3 and a cylinder 9 becomes weaker, the handling temperature field of the drug solution of a controlled system can be extended to an elevated-temperature side.

[0031] In addition, since face sealing structure of drawing 3 is premised on the face sealing structure of drawing 1 , it also has an operation and effectiveness of the face sealing structure of drawing 1 mentioned above.

[0032] Hereafter, the gestalt of the 3rd operation of this invention is made reference, and a drawing is explained. The configuration of the drug solution control valve of the gestalt of the 3rd operation is making the 2nd annular projection 25 which enclosed the surroundings of a valve seat 19 form in the top face 24 of the wall section 41 of a seal groove 21, i.e., the fastening side of the body 3, to the face sealing structure (to refer to drawing 1 ) of the drug solution control valve 1 of the gestalt of the 1st operation mentioned above, as shown in drawing 4 . Furthermore, the diaphragm 28 (thing equivalent to an "elastic seal member") is made to intervene in the face sealing structure of drawing 4 between the periphery lobe 22 of a diaphragm 8, and the fastening side 26 of a cylinder 9. This point and the periphery section of this diaphragm 28 are inserted between the periphery lobe 22 of a diaphragm 8, and the fastening side 26 of a cylinder 9, and the inner circumference section of this diaphragm 28 is inserted between a piston rod 10 and a diaphragm 8.

[0033] That is, in the face sealing structure of drawing 4 , since the 2nd annular projection 25 which

enclosed the surroundings of a valve seat 19 is made to form in the fastening side 24 of the body 3 and face sealing serves as double-seal structure, it is useful to improvement in the further safety of face sealing structure.

[0034] Moreover, by making the diaphragm 28 intervene between the periphery lobe 22 of a diaphragm 8, and the fastening side 26 of a cylinder 9, and controlling a hot drug solution in the face sealing structure of drawing 4 The body 3 and the diaphragm 8 made of fluororesins (PFA, PTFE, etc.) contract, and since it is suppliable with the elastic force of a diaphragm 28 even if the force which pinches a diaphragm 8 in the body 3 and a cylinder 9 becomes weaker, the handling temperature field of the drug solution of a controlled system can be extended to an elevated-temperature side.

[0035] In addition, since face sealing structure of drawing 4 is premised on the face sealing structure of drawing 1 , it also has an operation and effectiveness of the face sealing structure of drawing 1 mentioned above.

[0036] Hereafter, the gestalt of the 4th operation of this invention is made reference, and a drawing is explained. The configuration of the drug solution control valve of the gestalt of the 4th operation is making the labyrinth 29 which enclosed the surroundings of a valve seat 19 form in the top face 24 of the wall section 41 of a seal groove 21, i.e., the fastening side of the body 3, to the face sealing structure (to refer to drawing 1 ) of the drug solution control valve 1 of the gestalt of the 1st operation mentioned above, as shown in drawing 5 . Furthermore, O ring 27 (thing equivalent to an "elastic seal member") is made to intervene in the face sealing structure of drawing 5 between the periphery lobe 22 of a diaphragm 8, and the fastening side 26 of a cylinder 9.

[0037] That is, in the face sealing structure of drawing 5 , since the labyrinth 29 which enclosed the surroundings of a valve seat 19 is made to form in the fastening side 24 of the body 3 and face sealing serves as double-seal structure, it is useful to improvement in the further safety of face sealing structure.

[0038] Moreover, by making O ring 27 intervene between the periphery lobe 22 of a diaphragm 8, and the fastening side 26 of a cylinder 9, and controlling a hot drug solution in the face sealing structure of drawing 5 The body 3 and the diaphragm 8 made of fluororesins (PFA, PTFE, etc.) contract, and since it is suppliable with the elastic force of O ring 27 even if the force which pinches a diaphragm 8 in the body 3 and a cylinder 9 becomes weaker, the handling temperature field of the drug solution of a controlled system can be extended to an elevated-temperature side.

[0039] In addition, since face sealing structure of drawing 5 is premised on the face sealing structure of drawing 1 , it also has an operation and effectiveness of the face sealing structure of drawing 1 mentioned above.

[0040] In addition, various modification is possible for this invention in the range which is not limited to the gestalt of the above-mentioned implementation and does not deviate from the meaning. For example, although the 1st annular projection 23 is made to form in the inside side face of the periphery lobe 22 of a diaphragm 8 with the face sealing structure of the drug solution control valve 1 of the gestalt of the above-mentioned implementation as shown in drawing 1 , you may make it form in the wall side face 15 of a seal groove 21.

[0041] Moreover, the 1st annular projection 23 may be formed in the outside side face of the periphery lobe 22 of a diaphragm 8, or the outer wall side face of a seal groove 21.

[0042] Moreover, although the diaphragm 8 formed in the lower limit of a piston rod 10 when a piston rod 10 (thing equivalent to a "rod") moved to a top and down one stuck and estranged at the valve seat 19 with the face sealing structure of the drug solution control valve 1 of the gestalt of the above-mentioned implementation, the "rod" which formed the diaphragm 8 in this point and its lower limit may move to a top and down one by the solenoid, a motor, etc.

[0043]

[Effect of the Invention] In the condition of having made the periphery lobe of a diaphragm pressing fit in a seal groove in the drug solution control valve of this invention By having the 1st annular projection formed in the side face of the periphery lobe of a diaphragm, or the side face of a seal groove, and pressing a part of side face of a part of side face of a seal groove, or the periphery lobe of a diaphragm Peak value is given to the internal stress generated in the periphery lobe of a diaphragm. It has secured by concentrating on a part of side face of a part of side face of a seal groove, or the periphery lobe of a diaphragm, and making the "seal stress" of face sealing act. Furthermore, since the sum of the thickness of the wall section of a seal groove and the width of face of a seal groove is the same as the thing of the conventional technique Although a flow passage area (cross section of a valve seat, and an inflow way and an outflow way) does not become small, since width of face of a seal groove was narrowed and the thickness of the wall section of

a seal groove is increased The further safety of face sealing structure is securable, the seal groove made of a fluororesin not deforming greatly, and maintaining flow rate capacity, even if the peak value of the "seal stress" of face sealing is big.

[0044] Moreover, in the drug solution control valve of this invention, if the 2nd annular projection which enclosed the surroundings of a valve seat is made to form in the fastening side of the body, since face sealing will serve as double-seal structure, it is useful to improvement in the further safety of face sealing structure.

[0045] Furthermore, in the drug solution control valve of this invention, since it is suppliable with the elastic force of an elastic seal member even if the force which the body and the diaphragm made of a fluororesin contract and pinches a diaphragm in the body and a cylinder by controlling a hot drug solution becomes weaker if an elastic seal member is made to intervene between the periphery lobe of a diaphragm, and the fastening side of a cylinder, the handling temperature field of the drug solution of a controlled system can be extended to an elevated-temperature side.

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DRAWINGS

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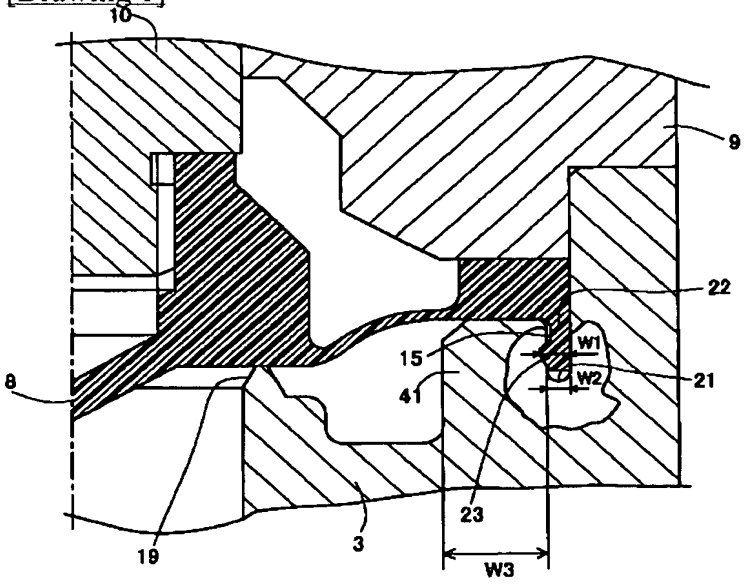
[Drawing 2]

| | W3 | W2 | つぶし代(%) |
|---|---|---|---|
| 本発明 | 1.4 | 0.3 | 20 |
| 従来技術 | 1 | 0.7 | 10 |

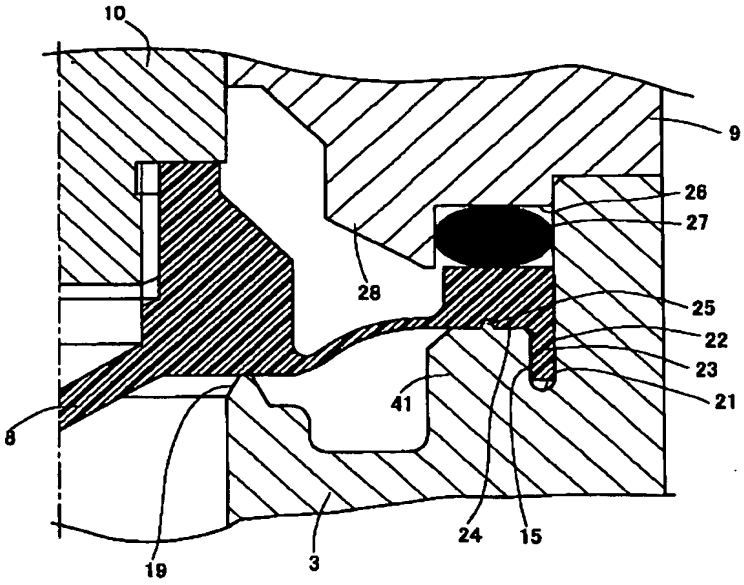
[Drawing 7]

| 温度範囲(℃) | ×10⁻⁶／℃ |
|---|---|
| 250～ 210 | 20 |
| 100～ 150 | 17 |
| 20～ 100 | 12 |
| 23～-180 | 11.5 |

[Drawing 1]



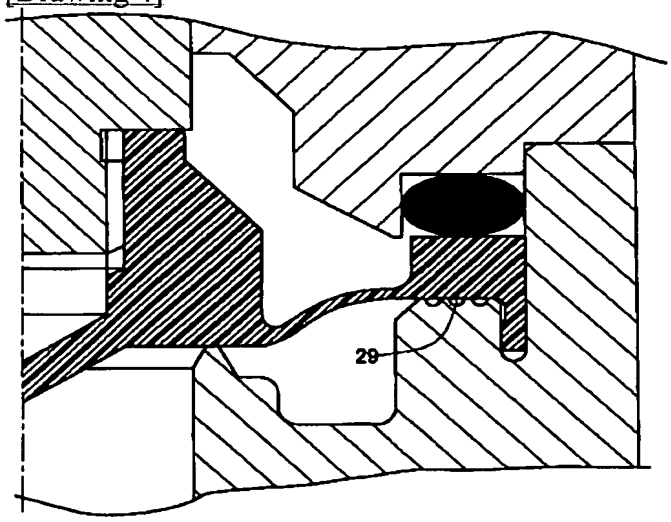

[Drawing 3]



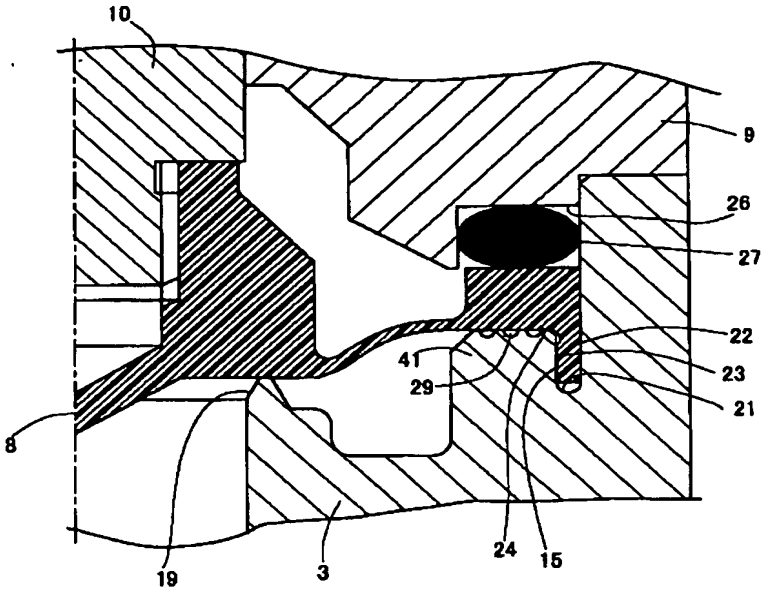

[Drawing 6]

| 温度範囲(℃) | ×10⁻⁶／℃ |
|---|---|
| 250～ 300 | 21.8 |
| ～ 250 | 17.5 |
| ～ 200 | 15.1 |
| ～ 150 | 13.5 |
| ～ 100 | 12.4 |
| ～ 50 | 12.4 |
| ～ 30 | 16.0 |
| ～ 20 | 79.0 |
| ～ 0 | 20.0 |
| ～ -50 | 13.5 |
| ～-100 | 11.2 |
| ～-150 | 9.6 |
| ～-190 | 8.6 |
| (10～20) | (16.0) |

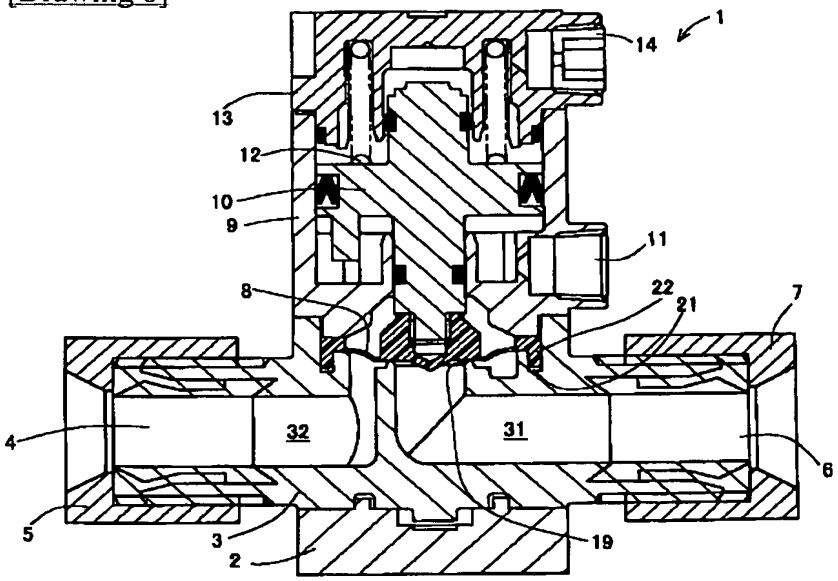
[Drawing 4]



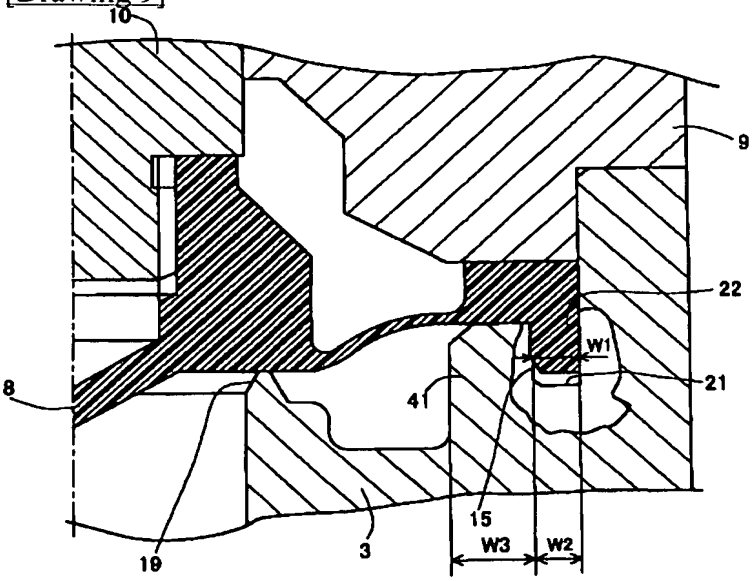

[Drawing 5]




[Drawing 8]




[Drawing 9]



[Translation done.]

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